

## **APPENDIX B**

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Irving DeVoe.

Confirm. No.: 9677

Application Serial No.: 10/626,209

Group Art Unit: 1797

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Docket Number: (Now 41613-101)

Title: SYSTEM AND METHOD FOR CONVERTING KINETIC ENERGY  
OF GASES OR LIQUIDS TO USEFUL ENERGY, FORCE AND WORK

## DECLARATION UNDER 37 CFR 1.132

I, William Grant McGimpsey, Ph.D. declare and state that:

1. I have been retained by Burns & Levinson, LLP on behalf of the Applicant (Inventor), Irving W. DeVoe, and the assignee Effusion Dynamics, Inc. to prepare this Declaration based upon my review of published Patent Application No. 2005/0016924 A1, published on January 25, 2005, naming Irving DeVoe as the sole inventor, and being entitled System and Method for Converting the Kinetic Energy of Gases or Liquids to Useful Energy, Force, or Work as well as the most recent Office Action therein, dated Dec. 12, 2007, and my own relevant education/experience. I have no other relationship with the inventor, Irving W. DeVoe, or the assignee, Effusion Dynamics, Inc.

2. I am currently Associate Provost for Research and Graduate Studies *ad interim* at Worcester Polytechnic Institute (WPI), Director of the WPI Bioengineering Institute, a Professor of Chemistry at WPI, and the President and Co-Founder, Active Surface Technologies Inc. A more complete CV is attached hereto as Exhibit A

3. I received my B.Sc. in Chemistry from Brock University, St. Catharines, Ontario, Canada in 1978.

4. I received my M.Sc. in Chemistry from Brock University, St. Catharines, Ontario, Canada in 1981.

5. I received my Ph.D. in Physical Chemistry from Queen's University, Kingston, Ontario, Canada in 1985

6. I completed 4.5 years as a research associate at the National Research Council of Canada from 1985-1989.

7. I joined WPI in 1989 as an assistant professor of chemistry, was appointed an Associate Professor in 1994 and promoted to a full Professor in 1998.

8. I have taught Chemical Thermodynamics to engineering and science majors at WPI from 1989 to 2005. In addition, I have taught hundreds of classroom hours in thermodynamics with focus on the first and second laws, the kinetic theory of gases, equilibrium, colligative properties such as boiling point elevation and osmotic pressure, phase diagrams etc., and, consequently, feel qualified to understand the skill level of one of ordinary skill in the art of thermodynamics, osmotic pressure and energy transfer.

9. In my position as associate provost, I oversee the WPI Office of Technology Transfer and I am familiar with evaluating intellectual property with respect to potential patentability.

10. I am a named inventor on 5 issued US Patents. (7,214,538; 6,902,720; 6,893,716; 6,746,595; 6,660,526)

With reference to the published application, I declare and state that:

11. I have read and reviewed the above-identified Published Patent Application No. 2005/0016924 A1, published on January 25, 2005 and understand the published patent application including its specification and claims as well as all of the figures contained therein.

12. I have read and reviewed the above-identified Office Action dated Dec. 12, 2007 and understand the contents thereof and factual issues raised in or by the Office Action.

13. The invention described and claimed in the published patent application involves a system for the use of osmotic fluid flow to generate fluidic pressure that can be coupled with a mechanical device such as a piston to convert the generated fluidic pressure into mechanical energy. The inventor accurately ascribes the energy considerations of this

device to the conversion of molecular kinetic energy, i.e., thermal energy, in one embodiment, to the kinetic energy of a piston.

14. In my opinion, it is well disclosed in the application for purposes of one of ordinary skill in the art that the system operates in three states. In the initial state there is a concentration gradient between the solvent and pressure chambers caused by the osmotic pressure generated by the solute and solvent solutions across the semi-permeable membrane. In the intermediate state, an equilibrium has been achieved between the osmotic pressure exerted by the solvent chamber and the mechanical pressure exerted by the pressure chamber. To reach this intermediate equilibrium state, work will flow out of this system as a result of a piston moving in response to the generated fluidic pressure developed in the pressure chamber. Finally, in the third state, the system is regenerated to the initial state by the introduction of solute into the pressure chamber and solvent into the solvent chamber and by the addition of energy to the system.

15. Paragraph 0060 of the application's Detailed Description section describes the separation of solvent and solute and the transfer of pure solvent to the solvent chamber and pure solute to pressure chamber (potentially as a solid product) in one embodiment, by freeze drying, by the application of energy in the form of heat or in some other form. In addition, Paragraph 0064 describes a source of heat (heating coils) for solvent evaporation, which supports that external energy must be added to the inventor's system in order to allow a recycling operation to be performed.

16. Paragraph 0090 of the Detailed Description of the Invention sets forth that the energy of the sun, presumably as ambient heat, but also potentially in other forms, is converted to the thermal energy of the molecules in the system, which in turn is eventually converted to the work flowing from the system. Solar energy that is inputted into the system (either as direct solar energy or in some converted form) is utilized to regenerate the initial state of the system. It is my opinion that, although, relying on ambient heat for regeneration will be a slow process, the system will work in this mode. It is clear to one of ordinary skill in the art that some form of energy must be added to the

system to regenerate the initial state and that for the system to work more effectively, other external sources of heat, for example, electric heating, using heating coils as discussed in Paragraph 0064, can be used.

17. These external sources of heat are described in various paragraphs including Paragraph 0064. It clear to one of ordinary skill in the art that a portion of the energy generated by the system can be used to evaporate the solvent in the recycling stage. It is also clear to one of ordinary skill in the art that other sources of externally supplied energy are usable, and must be used in order to effect the recycling step, such as, for example, the heat provided by heating coils described in Paragraph 0064. It is my opinion that Paragraph 0064 and other parts of the description clearly indicate that additional energy must be added and for this reason the invention does not violate the laws of thermodynamics.

18. It is my opinion that, based upon my review of the published application and the Office Action, both referred to above, that one of ordinary skill in the art would be able to practice the invention based upon the teachings and description set forth in the specification of the application.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



William Grant McGimpsey, Ph.D.

March 10, 2008  
Date